The Brattle Group

Impact of Portland Harbor Remediation Costs on City of Portland Water and Sewer Rates

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EXECUTIVE SUMMARY

This report analyzes the effect of allocating a portion of Portland Harbor remediation costs to the City of Portland, Oregon (the City). In particular, we focus on the effect on the City's water and sewer rates if the City were to choose to recover the cost of remediation through an increase in rates.

Portland Harbor was placed on the National Priority List (NPL) in 2000. The Environmental Protection Agency (EPA) has identified 142 potentially responsible parties (PRPs) for the Portland Harbor Site, and among these PRPs, a group was organized to coordinate remediation planning activities. The Lower Willamette Group (LWG) was organized to prepare the Remedial Investigation (RI) Report and Feasibility Study (FS) for Portland Harbor. This report uses information presented in the RI to measure the potential economic impacts of remediating Portland Harbor.

In an earlier report, *The Brattle Group* identified three scenarios with different estimated costs depending upon the threshold level of remediation of PCB contamination required by the EPA. Because the EPA has not announced the target clean-up thresholds for the Portland Harbor Site, it is impossible to say with certainty what the costs of clean-up will be. The cost varies with the threshold required, and the three scenarios range in cost from about $445 million to about $2.2 billion.

The allocation of costs to individual PRPs is also unknown at this time, so the amount of the remediation costs that may be allocated to the City is unknown as well. To analyze the effect on water and sewer rates for the City, we estimate the effect of allocating various levels of remediation costs to the City. We use the costs estimates of $445 million to $2.2 billion as a guide when considering the potential range of costs that may be allocated to the City. These cost allocations are not intended to provide a judgment as to the likely allocation to the City. Instead, the assumed allocations cover a wide range to reflect the uncertainty about the ultimate financial obligation of the City's water and sewer bureaus. Further, the ultimate rate effects experienced by consumers may not even fall within our projected range. For example, another remediation scenario is to let natural forces clear the river over an extended period of time; such a scenario would have no impact on rate payers.

In our analysis, we present an estimate of the total annual payment required to cover the amount of the total costs allocated to the City. The total annual payment in dollars depends upon how the City chooses to finance the cost. For example, the period of time over which the City chooses to amortize the costs affects the annual payment required, as does the expected interest rate on any debt used. We model recovery under both a 20-year and 30-year recovery period,

although other periods could be considered. We calculate annual payments required for recovery based upon an assumed 6% coupon rate.[1]

After estimating the required annual payment in dollars, we then calculate the effect on the City's water and sewer rates if the City were to decide to recover the costs of remediation in that way. In the analyses below, the percentage rate increases reported are based upon the combined total potable water sales revenue and sewer/stormwater user charges revenue of the Portland Water Bureau and the Bureau of Environmental Services.

We conclude that each $100 million in cleanup costs allocated to the City will increase water and sewer rates between 2.0% and 2.4%, depending on the specific assumptions made about financing terms. Thus, an allocation to the City of $600 million in remediation costs, the upper end of the range considered in this report, would increase water and sewer rates by 12% - 14.4% over baseline levels. A $300 million allocation would increase rates by 6.0% - 7.2%. These rate increases would persist over the duration of the loan term—20 or 30 years. The full results of our analysis are displayed in Table 2 below.

It is important to put these rate increases into context. Each $100 million assigned to the City represents a total financial liability over the project's life of nearly $250 in current dollars for each household among the 932,000 consumers receiving water from the City directly or indirectly.[2] A $300 million cost allocation to the City then implies a liability of nearly $750 per household, and a $600 million allocation implies a nearly $1,500 liability. Further, City water and sewer rates are projected to increase nearly 50% even without assuming the City's customers would bear a share of Superfund costs. The rate increases resulting from cleanup will be more burdensome since they come on top of an already significant projected increase in rates.

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[1] The 6% coupon rate is based upon the City's assumptions for debt costs in the PWB financial forecasting model.

[2] We use an average household size of 2.3 people per household, which is based on the 2008-2010 American Community Survey 3-year estimates for Multnomah County, Oregon.

I BACKGROUND ON CITY OF PORTLAND'S WATER BUREAU AND BUREAU OF ENVIRONMENT SERVICES

Before discussing the possible effects on the City's water and sewer rates, we first provide an overview of the Portland Water Bureau (fresh water service) and the Bureau of Environmental Services (sewer and stormwater service).

Portland Water Bureau

The Portland Water Bureau (PWB) serves potable water to about 932,000 Oregonian customers both directly and through 19 wholesale contracts within the Portland, Oregon metropolitan area, covering parts of Multnomah, Washington, and Clackamas Counties.[3] PWB directly serves 150,700 single family residential accounts, 10,500 multi-family residential accounts, and 20,000 commercial/industrial accounts, whose combined total population is over 566,000 people.[4] PWB's 19 wholesale customers serve 120,246 accounts whose estimated population is more than 366,000.[5] PWB's 19 wholesale water purveyors include cities, water districts, private water companies, and a people's utility district. While retail customers use 60% of water sold and wholesale customers use 40% of water sold, approximately 80% to 85% of water sales revenue comes from retail customers and 15% to 20% is derived from wholesale contracts.[6]

PWB's rates consist of two components: a fixed base charge and a commodity/volumetric rate. The base charge is calculated based on the actual number of days in a billing cycle and covers all water and/or sewer services connected directly to the City system.[7]

The commodity rate for retail accounts within city boundaries is $3.086 per hundred cubic feet (ccf) and is based on the actual consumption of individual accounts. The commodity rate for retail customers outside city boundaries is $0.669 per ccf for customers receiving water from supply conduits, and $2.789 per ccf for customers receiving water from the distribution system. The commodity rates for wholesale distributors are attached in the Appendix, Table A1. The PWB also provides discounted rates for qualified low income single-family residential accounts.

The typical residential account consumes 6 ccf per month for a total water bill of $27.85 per month in fiscal year 2011-12. Compared to similar sized cities around the U.S. this rate is relatively low. Table A5 in the appendix reports average monthly residential bills for several

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3 Portland Water Bureau website.

4 *City of Portland Oregon, First Lien Water System Revenue Bonds Series 2011A (OR) Official Statement*, CUSIP 736754KC5, Electronic Municipal Market Access, p. 18.

5 City of Portland Wholesale Customers Statistics For Fiscal Year ending June 30, 2011.

6 Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One, Citywide Summaries and Bureau Budgets, p. 296.

7 While the base charge covers all fixed charges for water and sewer services, the volumetric charges are different for water and sewer service.

cities. The range goes from Charlotte with a monthly average residential bill of $20 to Seattle which has a monthly average residential bill of almost $50. The typical medium sized commercial customer (with a 2" meter) consumes 200 ccf, for a total monthly bill of $645.19. Finally, the typical large-sized commercial customer (with a 10" meter) consumes 20,000 ccf for a total monthly bill of $62,288.

PWB has annual revenues of approximately $131.4 million from rates and charges. Retail services represent $111.1 million, wholesale services provide $16.4 million, system development charges generate $1.0 million, and $2.9 million is from other fees/charges.[8] The total annual budget for 2011-12 is approximately $198.8 million.[9]

Capital investments in the water system are funded through the Water Construction Fund, which has three major sources of finance: transfers from the Water Fund (primarily water sales revenues), net proceeds from revenue bond sales, and construction fund revenues (direct reimbursements, system development charges, and interest earnings). Approximately 26 percent of capital requirements are funded with current resources, and the balance comes from bond proceeds.[10] For further discussion of upcoming capital improvement projects, see the first section of the Appendix.

As of July 2011, the total outstanding debt for PWB was $395 million, with $333 million in first lien revenue bonds and $62 million in second lien revenue bonds.[11] The annual debt service for the Water Bureau Sinking Fund in FY 2011-12 was $32 million.[12] While bonds historically were sold every two years, PWB plans to sell bonds for the first three years and year five of the five-year planning period (beginning FY 2011-12) totaling $553.1 million, including a $163.4 million bond sale in Spring 2012.[13] Across the five years, cash financed capital funding from rate revenues is expected to provide approximately $142.6 million.[14] The bureau has the stated goal of meeting or exceeding a debt service coverage ratio of 1.90 on First Lien Bonds and 1.75 on both first and second lien bonds.[15] For a detailed look at PWB's forecasted outstanding debt schedule, see Appendix, Table A2.

Although the City's First Lien Water System Revenue Bonds were rated Aaa, the highest credit rating given by Moody's Investors Service, the financial market crisis has resulted in some

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8 *Water Rate Presentation to City Council,* May 18, 2011.

9 Ibid.

10 *Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budget, p. 307.

11 Ibid., p. 103.

12 *Adopted Budget, City of Portland, Oregon. Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, p. 87.

13 *FY 2011-12 Requested Budget,* Portland Water Bureau, pp. 19, 40.

14 Ibid., p. 20.

15 *Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, p. 307.

downgrading of municipal bond credit ratings.[16] According to the Electronic Municipal Market Access (EMMA) website, the City's First Lien Water System Revenue Bonds Series 2011A have yields ranging from 3% for a bond with a maturity date in 2012 up to 5% for a bond with a maturity date in 2014. In PWB's financial forecasting model, the PWB assumes interest rates on first lien bonds ranging from 4.75% to 6% for FY 2011-16.[17]

The forecasted rate increases for the five-year planning period are 13.9 percent for FY 2011-12, 14.3 percent for FY 2012-13, 14.0 percent for FY 2013-14, 13.3 percent for FY 2014-15, and 10.8 percent for FY 2015-16.[18] The monthly fixed charge for quarterly billed customers was $8.26 in FY 2010-11 and is projected to increase to $15.40 in FY 2015-16. As a consequence of these rate and fixed charge increases, retail users can expect increases in their average volumetric charge per ccf: $2.73 in FY 2010-11, and 5.09 in FY 2015-16. Based on these projections, a single family residential home consuming 6 ccf per month will see their monthly bill go from $24.66 in FY 2010-11 to $45.95 in FY 2015-16.[19] These projected rate increases are due in part to the capital investments required to meet the EPA's new LT2 rules.

According to the FY 2011-12 Request Budget issued by the Portland Water Bureau, forecasted rate increases will cover capital investments required to comply with the LT2 rule; however, rate increases will likely be adjusted given that the Oregon Health Authority (OHA) has granted an LT2 exception.[20] The forecasted rates take into account other factors including inflation, previously deferred increases, and for projected reductions in operating costs. In addition, these rate forecasts are calculated under the assumption of reduced demand—since volumetric rates recover past fixed costs, rates will necessarily experience further increase when demand goes down (as can be seen in Figure 1).[21] Consistent with this assumption, retail water demand has been steadily declining since 2003 due to water conservation and the installation of new water efficient plumbing fixtures and appliances.[22] For a detailed look at the PWB's forecasted rates, see Appendix, Table A3.

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16 Ibid., pp. 50, 298.

17 *FY 2011-12 Requested Budget,* Portland Water Bureau, Table A2.

18 *FY 2011-12 Requested Budget,* Portland Water Bureau, p. 12.

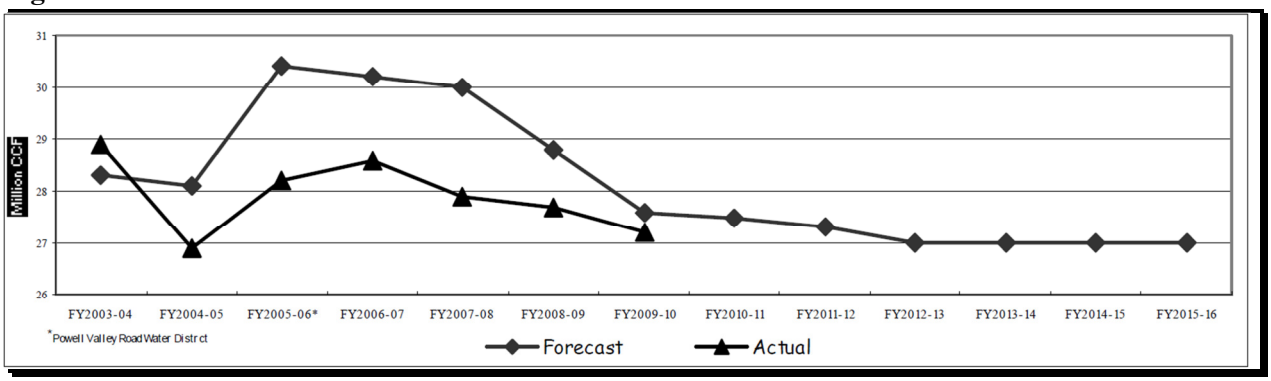
19 *City of Portland Oregon, First Lien Water System Revenue Bonds Series 2011A (OR) Official Statement*, CUSIP 736754KC5, Electronic Municipal Market Access, p. 55.

20 The Oregon Health Authority granted the Portland Water Bureau a variance on March 14, 2012. This relieves them of the requirement to install a UV treatment plant with an estimated cost of $100 million. It is not clear how EPA will respond. For more details on this issue, see the first section of the Appendix.

21 *FY 2011-12 Requested Budget,* Portland Water Bureau, p. 12.

22 *Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, p. 300.

Figure 1. Actual and Forecasted Water Demand: 2003-2016



Source: *FY 2011-12 Requested Budget,* Portland Water Bureau, p. 48.

Bureau of Environmental Services

The Bureau of Environmental Services (BES) provides Portland residents with water quality protection, stream and watershed planning and restoration, wastewater collection and treatment, sewer installation and maintenance, and stormwater management. BES operates and maintains sanitary sewer and stormwater collection systems serving approximately 186,656 accounts whose population is over 580,000 people. As of 2010, there were 162,936 single-family residential accounts, 10,311 multi-family residential accounts, and 13,409 commercial accounts (3,423 large accounts and 9,892 medium/small accounts).[23]

The sanitary sewer system user service charge consists of two components: a fixed charge and volumetric charge. There is only one fixed charge for potable and sewer services, hence the details for the fixed charge are the same as previously discussed in the PWB section on rate structure. The volumetric charge for residential users is $7.54 per ccf of water consumption. For non-residential, commercial, industrial, and institutional users, the volumetric charge is $7.629 per ccf of water consumption.[24]

Since the City of Portland is a potential responsible party in the Portland Harbor Superfund Remediation Site, the City added a Portland Harbor Superfund Program charge to City sewer bills as of July 2007. The additional charge has two components: $0.09 per ccf of billed sewer volume and a charge of $0.33 per thousand square feet of impermeable area (an impermeable ground cover or surface, such as paved roads, roofs, sidewalks, and structures).[25] The charge for the Superfund Remediation has collected $26.7 million over the past four fiscal years (FY 2008-09 through FY 2011-12) as can be seen in Table 1 below.[26]

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[23] *City of Portland Oregon, Second Lien Sewer System Revenue Bond, 2010 Series A (OR) Official Statement*, CUSIP 736742ST5, Electronic Municipal Market Access, Table 15, p. 46.

[24] *Fiscal Year 2011-12 Sewer and Drainage Rates and Charges*, Bureau of Environmental Services.

[25] Accessed from < http://www.portlandonline.com/water/index.cfm?a=182724&c=29415>.

[26] *Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, Table 5, p. 88.

Table 1. Environmental Remediation Fund Revenues (FY 2008-09 through FY 2011-12)

Actual FY 2008-09	Actual FY 2009-10	Revised FY 2010-11	Adopted FY 2011-12	Total
$5,639,439	$7,169,451	$6,791,051	$7,091,868	$26,691,809

Source: *Adopted Budget, City of Portland, Oregon. Fiscal Year 2011-12, Volume One*, Citywide Summaries and Bureau Budgets, Table 5, p. 88.

The total sewer user charges for FY 2010-11 were $231 million.[27] The complete source breakdown can be seen in Appendix, Figure A1.

Approximately 60% of Portland's population is served by a combined sewer system which carries both domestic sewage and stormwater runoff. Prior to recent capital improvements, rain frequently caused stormwater runoff to exceed the carrying capacity of the combined sewers, causing overflows through outfalls to both the Willamette River and the Columbia Slough – a significant source of pollution in these two waterways. In the past two decades, BES has completed a number of Capital Improvement Plans to address combined sewer overflow (CSO) issues, including the series of projects to address the Columbia Slough outfalls and the Tanner Creek and West Side CSO tunnel, shafts, pump station, and pipeline projects for the west side of the Willamette River. In 2011, several CSO improvement projects were completed, including the East Side CSO Tunnel, the Portsmouth Force Main, the Balch Consolidation Conduit, and the Sellwood CSO Pump Station.[28] The East Side CSO is the largest project and is expected to reduce combined sewage and stormwater overflows to the Willamette River by more than 94%.[29]

As of July 2011, BES has $1.65 billion in outstanding debt, with $938 million in first lien revenue bonds, $695 million in second lien revenue bonds, and $21 million in third lien revenue bonds.[30] In 2011, the annual debt service was approximately $150 million.[31] The City forecasts capital requirements for the sewer system of approximately $688 million during the forecast period from FY 2009-10 through FY 2014-15.[32] Based on current planning assumptions, the bureau's five year Capital Improvement Plan request will require $470 million (2011 nominal dollars) in additional borrowings over the next five fiscal years.[33]

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27 *Source*: *Financial Plan and Budget Background – Presentation to Budget Advisory Committee,* Bureau of Environmental Services, October 25, 2010, p. 5.

28 Information in this paragraph is derived from: *Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, pp. 263-264.

29 <http://www.portlandonline.com/cso/index.cfm?c=31727> Date Accessed: March 14th, 2012.

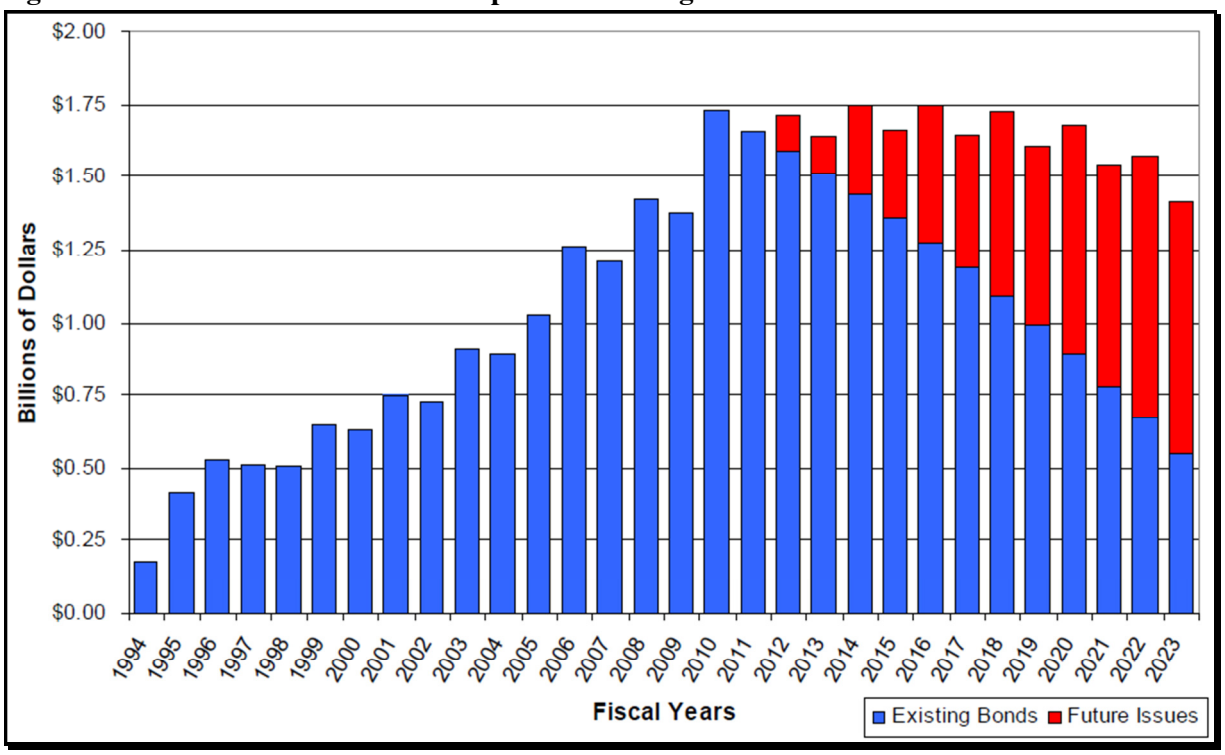
30 *Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, p. 103.

31 Ibid, p. 104.

32 *City of Portland Oregon, Second Lien Sewer System Revenue Bond, 2010 Series A (OR) Official Statement*, CUSIP 736742ST5. Electronic Municipal Market Access, Table 15, p. 25.

33 *Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, p. 268.

Figure 2. Sewer Revenue Bonds: Principal Outstanding



Source: *Financial Plan and Budget Background – Presentation to Budget Advisory Committee,* Bureau of Environmental Services, October 25, 2010, p. 7.

The BES has the stated financial goal of maintaining debt service coverage ratios of 1.5 on first lien debt, 1.30 on combined first and second lien debt, and an ongoing reserve of ten percent of operating expenses for unforeseen financial needs.[34]

The bureau's current bond rating is Aa3/ AA, which is a strong rating for sewer revenue credit.[35] BES's debt service coverage ratio for all revenue bonds was 1.3 for FY 2009-10.[36] According to the EMMA website, Portland's Sewer System Second Lien Revenue Bonds have a range of yields from 2% for a maturity date in 2011, to 5% for a maturity date in 2035. The BES's financial forecast model assumes an "average annualized coupon rate of 5.5% for the bonds sold in FY 2011-12 and FY 2012-13, and 6.0% for the bonds sold in FY 2014-15."[37]

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[34] Ibid.

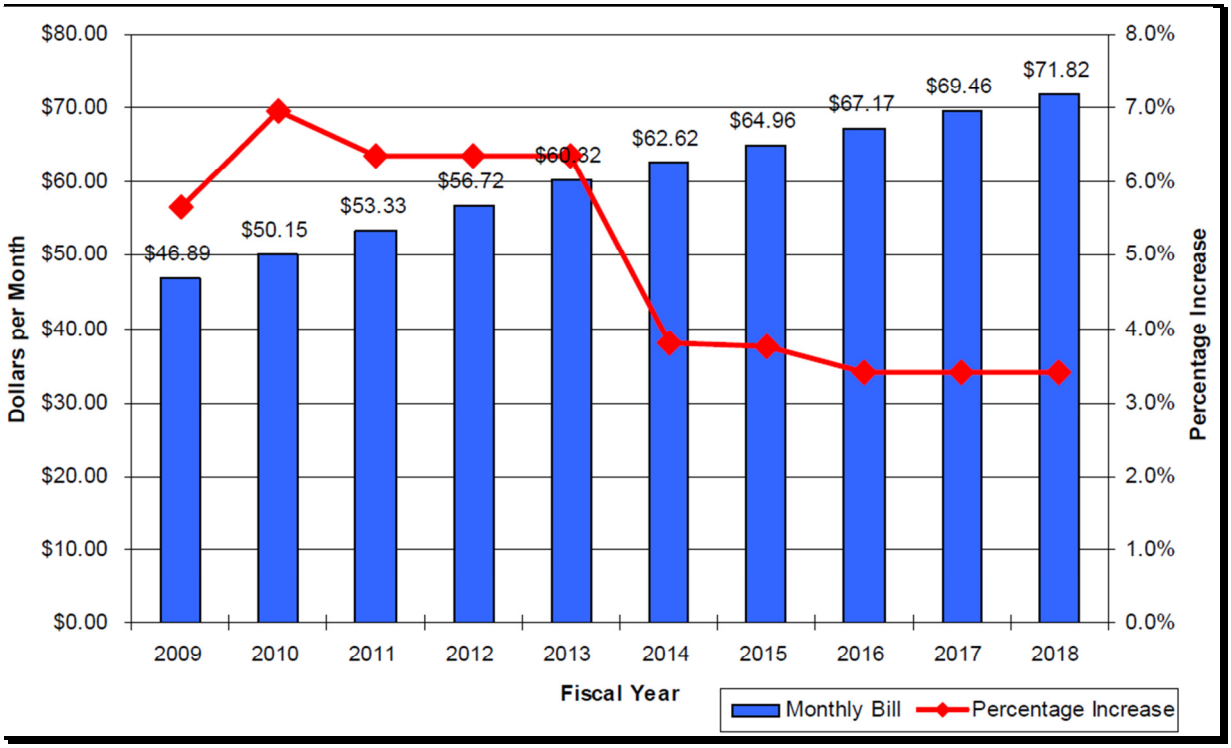
[35] *Adopted Budget, City of Portland, Oregon, Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, p. 271.

[36] Ibid.

[37] Ibid., p. 268.

Over the five-year forecast period from 2011-2016, the bureau forecasts annual sewer rate increases of 6.0% in the first year, 6.5% in the second year, 5.9% in the third year, 5.0% in the fourth year, and 4.7% in the fifth year.[38]

Figure 3. Current and Forecast Average Monthly Sewer Bills for Single Family Residential



Reproduced from: *Financial Plan and Budget Background – Presentation to Budget Advisory Committee.* Bureau of Environmental Services, October 25, 2010, p. 13.

Summary of Combined Water and Sewer Rate Increases

In FY 2010-11, the average monthly bill for a residential account was estimated to be $24.66 and $53.33 for potable water and sewer services, respectively. Thus the average total monthly water bill in 2010-11 was $77.99. According to the planned rate increases in the FY 2011-12 citywide budget, the average monthly bill for a residential account is expected to rise to $45.95 and $70.09 by FY 2015-16 for potable water and sewer services, respectively.[39] This represents a nearly 50% expected increase in the average total water bill to about $116 over the five year period from FY 2010-11 to FY 2015-16.

[38] Ibid., pp. 261-262.

[39] Note that the forecasted average monthly sewer bill in Figure 3 differs slightly from our analysis because the chart in Figure 3 is based on a draft budget; however the values we calculate are based on the adopted budget's forecasted annual rate increases.

II. RATE EFFECTS OF ALLOCATION OF REMEDIATION COSTS TO THE CITY

The EPA has identified 142 potentially responsible parties (PRPs) for the Portland Harbor Site. The dollar amount of remediation costs allocated to any party depends upon the remediation threshold (i.e., the scenarios above) and the method selected to allocate costs among the PRPs. Here we consider the economic effect of allocating various percentages of the total costs to the City of Portland. We use the cost estimates of $445 million to $2.2 billion established in an earlier *Brattle* report as a guide when considering the potential range of costs that may be allocated to the City. For example, a $100 million allocation to the City represents approximately a 22% share of $445 million, and $600 million represents approximately 27% of $2.2 billion. While these percentage allocations should not be interpreted as what will actually happen, they are illustrative and are not inconsistent with possible outcomes. Ultimately, the required rate increase may be as low as zero or may be even higher than the allocations considered here.

Table 2 below reports the effect on the combined water and sewer rates for the City of Portland for costs allocated by percentage of the total remediation costs. To understand Table 2, it is necessary to understand the assumptions underlying the calculations.

Assumptions for Table 2

The first assumption is that the estimated cost of remediation for the remediation scenarios is a present value, i.e., a current value. The implication is that although the actual costs of remediation may be spread out over some period of time, the total cost in current dollars is in the vicinity of the values estimated. This assumption avoids having to estimate the timing and size of the expenditures over the period required to complete the project. Using the remediation costs estimates as a guide, we consider cost allocations to the City ranging from $100 million to $600 million in $100 million increments.

The second assumption is that the City will finance the remediation through the issuance of long-term municipal bonds with a present value equal to the amount allocated to the City.[40] The City has the choice of term (time to maturity) for any debt issued and the level of security to assign to the debt.[41] The required interest rate on the debt would be a function of the term and the level of security. Of course, the interest rate on any new debt also depends upon economic conditions at the time the debt is issued. The table reports the costs for a twenty and thirty year term under a six percent coupon rate on the municipal bonds issued. The City could choose to issue debt with different maturities, and interest rates may be different at the time the debt is issued.

The third assumption implemented in Table 2 is that the payments are levelized in order to amortize the bonds over the term selected as opposed to issuing bonds with interest-only

[40] We assume that the costs of remediation of the Portland Harbor would be a use that qualifies for financing with municipal bonds.

[41] The level of security is whether the City makes the bonds a general obligation of the City or makes payment dependent upon revenues from the water system, for example.

payments over the years and a final principal payment at the end. The pattern of payments in the table can be duplicated with a sinking fund for the bond principal.

Table 2. Annual Remediation Costs

Allocation to City (in millions of dollars)		6% Coupon Interest Rate	
		20 Year	30 Year
$100	Annual Payment[1,2]	$8.7	$7.3
	Rate Increase[2]	2.4%	2.0%
$200	Annual Payment	$17.4	$14.5
	Rate Increase	4.8%	4.0%
$300	Annual Payment	$26.2	$21.8
	Rate Increase	7.2%	6.0%
$400	Annual Payment	$34.9	$29.1
	Rate Increase	9.6%	8.0%
$500	Annual Payment	$43.6	$36.3
	Rate Increase	12.0%	10.0%
$600	Annual Payment	$52.3	$43.6
	Rate Increase	14.4%	12.0%

Notes:
1. Annual payments are in millions of dollars ($1,000,000).
2. The rows labeled "Annual Payment" show the estimated annual remediation costs for six potential cost allocations to the City of Portland, Oregon. The rows labeled "Rate Increase" show the percentage increase in the combined water and sewer rates for a given cost allocation.

The final assumption is to measure the percentage increase in water rates based upon the sum of the revenues of the Water Bureau and the Bureau of Environmental Services for FY 2011-12 and FY 2010-11, respectively.[42] Although the total dollar costs allocated to the City would not change, the percentage effect on water and sewer rates depends upon how the City elects to recover the remediation costs. For example if all costs were allocated to the water commodity charge, the percentage increase would be different.

As shown in Table 2, assuming a $100 million allocation to the City with full recovery over 30 years at a 6 percent cost of debt, the total increase in costs for the Water Bureau and Bureau of Environmental Services would be approximately 2.0%. However, assuming a $600 million allocation to the City with full recovery over 20 years at a 6 percent cost of debt, the total increase in costs for the Water Bureau and Bureau of Environmental Services would be approximately 14.4%.

The City already collects about $7 million annually from a Superfund Program charge on City sewer rates. The funds generated are used to support the work of the Lower Willamette Group,

[42] We were unable to determine the sewer user charges share of annual total Bureau of Environmental Services revenues for the FY 2011-12, so the sewer user charges revenues from FY 2010-11 was used as a proxy.

which is responsible for various investigations relating to the Portland Harbor site. This Superfund Program charge currently being collected has not been used to modify the rate increases displayed in Table 2. That is, our analysis measures an increment between the current rates assuming some cost share assigned to the City versus one in which there is no such assignment. The required rate increases displayed in Table 2 would be lower if the money currently collected from the Superfund Program Charge could be used for the remediation costs allocated to the City.

Additional Caveats

Some additional caveats for the results presented in Table 2 are in order. First, the cost estimates of remediation are in current dollars, but the remediation is not likely to begin for at least five years and perhaps longer. The costs will undoubtedly change by then, but by how much is not known. Second, as noted above, in the Five-Year Plan, the PWB forecasts a cumulative water rate increase of 86.3% over the period FY 2011-12 to FY 2015-16 with an average annual increase of 13.26%. The corresponding cumulative rate increase forecast for the BES sewer rate is 31.4% over the period FY 2011-12 to FY 2015-16, with an average annual increase of 5.62%. As water and sewer rates increase, the percentage increase in rates reported in Table 2 will decrease, assuming that the percentage increase in the water and sewer rates is greater than the percentage increase in the cost of remediation. The recent approval of the City's request for a treatment variance of the LT2 rule may delay or avoid a substantial portion of the projected increase in the PWB's rates.

In the analyses presented in Table 2, we elected not to use the information on the forecast increases in the water and sewer rates when evaluating the impact of an allocation of remediation costs to the City. We make this judgment based on the fact that current remediation estimates and the current water and sewer revenues are both in current dollars. Although both the water and sewer rates and the cost of remediation are likely to increase in the future, the exact changes are unknown at this time. Use of future estimates would inject an additional element of uncertainty in the analyses.

We have elected to report the percentage increase due to remediation costs on the total of the water and sewer revenues; however, the City could elect to pay for its allocated share of the remediation costs in other ways. For example, the City could allocate all of the cost only to sewer rates, the monthly fixed cost of water and sewer service, or just to the water commodity charge. Each of these choices would have a different distributional effect on the citizens of Portland even though the total dollar cost of the remediation would be unchanged. The City also has other the sources of revenue that could be used to finance the remediation costs including property taxes, license fees, service charges, and lodging taxes. Appendix, Table A4 shows the City's sources of revenues for the FY 2011-2012. Within the laws governing such revenue sources, the City could allocate recovery of the costs of remediation to some or all of the alternative sources of revenue.

Optimal Method of Cost Recovery

In this report, we have not attempted to select or recommend an "optimal" method of cost recovery because there are likely to be a number of economic and non-economic factors that

would inform the City's decision, but there are some factors to consider. The City would likely seek to minimize the effect on its citizens to the extent possible. This suggests that spreading the cost recovery over a longer period would be desirable, but this would be offset by the likely increase in the required interest rate for longer term debt. The contamination in the harbor is the result of many years of accumulation, so it makes sense to recover the cost of remediation over a longer rather than shorter period.

The cost recovery displayed in Table 2 is based upon an assumption that the dollar amount of costs recovered are constant in every year of the recovery period, which means that the charge would be a decreasing percentage of the total water and sewer rates as those rates increase over time. Of course, levelized recovery is not required. Cost recovery could be "shaped" so that the amount of recovery is calculated to be a constant percentage of the water and sewer revenues or shaped to increase with inflation. If the recovery were shaped, the initial required increase in rates would be lower. There are many ways to recover the costs, but each will have a different effect on various groups within the City.

The City's decision on cost recovery could also affect water consumption. For example, if the City were to allocate all or even a substantial portion of the remediation cost to the volumetric portion of the water rate, consumption is likely to decline because a higher volumetric rate would induce additional water conservation. As shown in Figure 1 above, water consumption in the City has declined and is forecast to continue to decline due to water conservation. A substantial increase in the volumetric charge would likely accelerate the decline in water consumption. In addition, the resulting decrease in consumption would require further volumetric rate increases so that the PWB could recover its costs. Economic theory suggests that it is most efficient to recover a fixed cost such as the cost of remediation through a fixed charge as opposed to a variable charge because the cost of remediation will not change with the volume of water consumed. In other words, consumers' surplus is greater if the fixed cost is recovered through a fixed charge, but as noted above the distributional effects on different groups within the City are affected by the choice of recovery. On the other hand, if the City seeks to promote water conservation, increasing the volumetric charge will induce additional conservation. However, reduced consumption would require an increase in the volumetric rate to the extent that any of the fixed costs of providing water service are recovered in the volumetric rate.

III. CONCLUDING REMARKS

Based on potential remediation cost estimates ranging from $445 million to $2.2 billion, allocating a portion of the costs of remediating the Portland Harbor Superfund site could result in significant rate increases borne by the City of Portland's water and sewer customers. If the City is obligated to pay $100 million in cleanup costs, it would need to increase combined water and sewer rates by 2.0% to 2.4% per year, depending on the specifics of the financing. If the City were assigned a $300 million cost share, rates would climb by 6.0% - 7.2%. If it were assigned a $600 million cost share, then rates would escalate by 12% - 14.4%. These annual rate increases will continue as long as the City water and sewer bureaus are making payments on the associated debt, which we assume could be as long as 30 years.

It is important to put these rate increases into context. Each $100 million assigned to the City represents a total financial liability over the project's life of nearly $250 in current dollars for each household among the 932,000 consumers receiving water from the City directly or indirectly. A $300 million cost allocation to the City then implies a liability of nearly $750 per household, and a $600 million allocation implies a nearly $1,500 liability. Further, City water and sewer rates are projected to increase nearly 50% even without assuming the City's customers would bear a share of Superfund costs. The rate increases resulting from cleanup will be more burdensome since they come on top of an already significant projected increase in rates.

Appendix

In January 2006, the Environmental Protection Agency (EPA) issued the Long-Term 2 Enhanced Surface Water Treatment Rule (LT2) to reduce illness linked with Cryptosporidium and other pathogenic microorganisms in drinking water. The rule requires treatment of PWB's Bull Run surface water supply by April 1, 2014. PWB budgeted $19.5 million in the 2011-12 fiscal year for the design of a $100 million UV treatment plant to bring their water supplies into compliance. The rule also requires that uncovered finished drinking water reservoirs either be covered or provided additional treatment. In response, PWB plans to build and operate additional and replacement enclosed drinking water storage reservoirs by December 31, 2020 including the construction of an enclosed 50 million gallon storage reservoir at Powell Butte, increasing the storage capacity at Kelly Butte by 25 million gallons, replacing Washington Park Reservoir 3 with a 15 million gallon buried storage tank, and the construction of transmission pipes and other system improvements.[43] The total estimated cost of reservoir projects is $300 million.[44]

In June of 2011, the PWB submitted a request to the EPA for a treatment variance, which would exempt the Bureau from the treatment portion of the LT2 rule. This treatment variance was approved by the Oregon Health Authority (who has the authority to enforce the LT2 rule) on March 14, 2012, thereby saving Portland rate payers approximately $70 million by avoiding the construction of a new treatment facility.[45] The variance will go into effect on April 1st, 2012 and will be in effect for 10 years, given Portland is able to continue to meet a list of conditions. Assuming the City is able to maintain the treatment variance, the forecasted water rates will need to be adjusted to account for the reduction in future capital improvements. The variance only applies to the treatment portion of the LT2 rule, and the City will still be required to end the use of its uncovered finished drinking water reservoirs at Mt. Tabor and Washington Parks. EPA has scheduled a second public meeting on April 24, 2012 for a scientific and technical discussion with regards to this matter.

In order to comply with the Endangered Species Act requirements, PWB is also planning a $33 million project to improve the Dam 2 tower multilevel intake.[46] Additional significant projects include $48 million in improvements to the Interstate maintenance facility, $10 million for the Fulton pump station improvement, and $8 million for the PWB portion of the city emergency coordination center.[47]

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[43] *Adopted Budget, City of Portland, Oregon. Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, p. 249.

[44] *City of Portland Oregon, First Lien Water System Revenue Bonds Series 2011 A (OR) Official Statement*. CUSIP 736754KC5, Electronic Municipal Market Access, p. 25.

[45] <http://www.portlandonline.com/water/index.cfm?a=389391&c=39678>. *Portland Water Bureau Obtains Water Treatment Variance.* Date Accessed: March 23rd, 2012.

[46] *Adopted Budget, City of Portland, Oregon,. Fiscal Year 2011-12, Volume One,* Citywide Summaries and Bureau Budgets, p. 309.

[47] Ibid, p 304.

Currently, the City charges its wholesale water distributors the commodity rates listed in Table A1 below.

Table A1. Commodity Rates for Wholesale Distributors

Wholesale Water Customer	Rates
GNR Water Company	$0.537
Green Valley Water Company	$0.537
Hideaway Hills Water Company	$0.537
Lorna Water Company	$0.537
Skyview Acres Water Company	$0.537
Two Rivers Water Association	$0.537
City of Gresham	$0.545
Lusted Water District	$0.923
Pleasant Home Water District	$0.823
Rockwood Water PUD	$0.524
Palatine Hill Water District	$1.642
Burlington Water District	$0.999
Lake Grove Water District	$1.162
City of Tigard	$1.402
Valley View Water District	$1.676
West Slope Water District	$1.290
Tualatin Valley Water District	$0.922
Raleigh Water District	$0.762
City of Tualatin	$0.818

Source:
2011/2012 Water Rates: Council Ordinance. Ordinance No. 184626. Portland Water Bureau.

Notes:
Rates are dollars per ccf (hundred cubic feet).

Table A2 provides the current outstanding and forecast debt balances for the PWB through FY 2016.

Table A2. City of Portland Water Bureau: Outstanding Debt Schedule

	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Current Revenue Debt						
Total First Lien	$249,525	$239,150	$228,315	$216,990	$205,130	$192,740
Total Second Lien	$62,420	$60,585	$58,670	$56,665	$54,560	$52,345
Total Current Debt	$311,945	$299,735	$286,985	$273,655	$259,690	$245,085
Future Revenue Debt						
Proposed First Lien	$87,035	$85,148	$232,006	$341,407	$334,281	$453,454
Proposed Second Lien	$0	$163,380	$160,402	$157,246	$153,900	$150,353
Total Proposed Debt	$87,035	$248,528	$392,408	$498,652	$488,180	$603,807
Total Revenue Debt Outstanding (year end)	$398,980	$548,263	$679,393	$772,307	$747,870	$848,892

Source: FY 2011-12 Requested Budget, Portland Water Bureau, Table A4.

Note: Dollar amounts in thousands (000's)

Table A3 provides the current and forecast average water bills for retail customers in the City exclusive of possible additional Portland Harbor costs.

Table A3. City of Portland Water Bureau: Current and Forecast Water Rates and Water Bills

Fiscal Year Ending June 30	2010-11[1]	2011-12	2012-13	2013-14	2014-15	2015-16
Water Usage Rates						
Retail Volume Rate (per ccf) [2]	$2.733	$3.113	$3.558	$4.056	$4.595	$5.091
Base Charge						
Total Base Charge per Bill	$24.79	$28.24	$32.38	$36.80	$41.70	$46.21
Quarterly Billed Customer per Month	$8.26	$9.41	$10.76	$12.27	$13.90	$15.40
Monthly Billed Customer	$24.79	$28.24	$32.28	$36.80	$41.70	$46.21
Monthly Water Bills						
Residential (6ccf)	$24.66	$28.09	$32.11	$36.60	$41.47	$45.95
Medium Commercial (200 ccf)	$571.39	$650.84	$743.88	$848.00	$960.70	$1,064
Large Commercial (20,000 ccf)	$54,685	$62,288	$71,192	$81,157	$91,942	$101,866
Low Income Residential (5 ccf) [3]	$10.96	$12.49	$14.28	$16.28	$18.44	$20.43
Retail Effective Rate Changes	12.0%	13.9%	14.3%	14.0%	13.3%	10.8%

Source:
City of Portland Oregon, First Lien Water System Revenue Bonds Series 2011A (OR) Official Statement , CUSIP 736754KC5, Electronic Municipal Market Access, Table 20, p. 56.

Notes:
1. Reflects rate schedule approved by the City Council on May 26, 2010. Rates shown for future years are based on projections which may be updated or revised. Future year rates are subject to Council review and approval.
2. Applies to substantially all retail customers.
3. Bills for low income residential customers include a discount on water usage and the base charge.

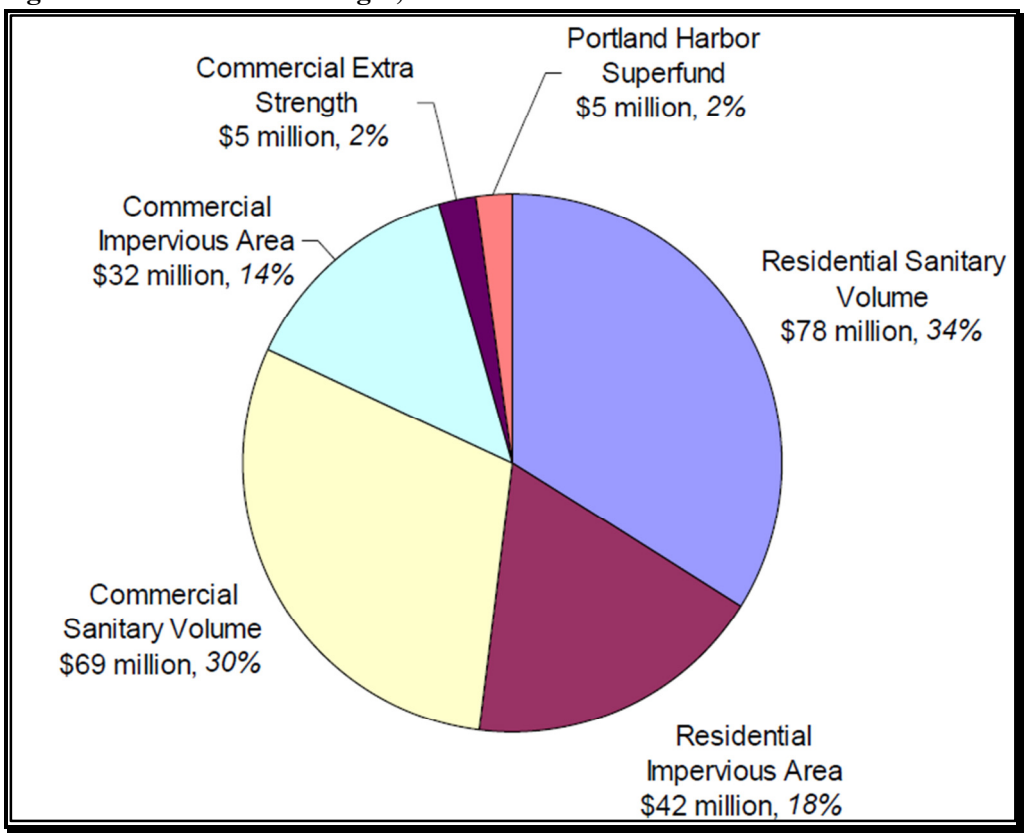
Table A4 shows the City's sources of revenue that could perhaps be increased to pay for the costs of remediation if the City were to decide not to rely completely on rate increases for water and sewer services.

Table A4.

Resource	Budget	Percent
Property Taxes	$198,009,386	39.6%
Utility License Fees	$70,813,350	14.2%
Business Licenses	$67,386,974	13.5%
Transfers from Other Funds	$58,741,237	11.8%
Beginning Fund Balance	$39,382,981	7.9%
Service Charges & Other	$25,537,604	5.1%
Intergovernmental	$24,705,316	4.9%
Lodging Taxes	$15,248,600	3.1%
Total General Fund Budget	$499,825,448	100.0%

Source:
Adopted Budget, City of Portland, Oregon. Fiscal Year 2011-12, Volume One, Citywide Summaries and Bureau Budgets, p. 31.

Figure A1. Sewer User Charges, FY 2010-11



Reproduced from: *Financial Plan and Budget Background – Presentation to Budget Advisory Committee.* Bureau of Environmental Services, October 25, 2010, p. 5.

Table A5 shows the average monthly residential potable water bill for cities comparable to Portland, Oregon, both locally and nationally. The rates shown for Portland include the monthly base charge in addition to the average volumetric charge based on 6 ccf of water consumption. These do not include costs associated with sewage.

Table A5. City of Portland Water Bureau: Comparison of Residential Monthly Water Bills

Water Utility (Effective Date) [1]	Residential Monthly Bill (6 ccf)	Residential Monthly Bill (10 ccf)
Local		
Milwaukie, City of (2010)	$14.52	$21.60
Rockwood Water PUD (2010)	$17.08	$24.31
Tualatin, City of (2010)	$20.64	$29.80
Lake Oswego, City of (2010)	$20.78	$25.78
Beaverton, City of (2010)	$21.32	$30.20
Tualatin Valley Water District (2010)	$21.60	$31.48
PORTLAND, CITY OF (2010)	$24.66	$35.59
Tigard, City of (2011)	$28.02	$39.94
Gresham, City of (2011)	$31.38	$39.66
West Slope Water District (2010)	$31.82	$48.22
National		
Charlotte (2010)		$20.14
Cincinnati (2010)		$23.64
Denver (2011)		$24.03
Sacramento (unmetered) (2010)		$34.35
Kansas City (2010)		$36.65
Seattle-winter (2011)		$49.20

Source:
City of Portland Oregon, First Lien Water System Revenue Bonds Series 2011A (OR) Official Statement, CUSIP 736754KC5, Electronic Municipal Market Access, Table 14, p. 47.

Notes:
1. Calculations are based on rates in effect as noted, and the City's rates are effective July 1, 2010 through June 30, 2011.

Table A6. City of Portland Bureau of Environmental Services Sewer System: Comparison of Average Monthly Sewer and Stormwater Bills For Single Family Residential Monthly Customers

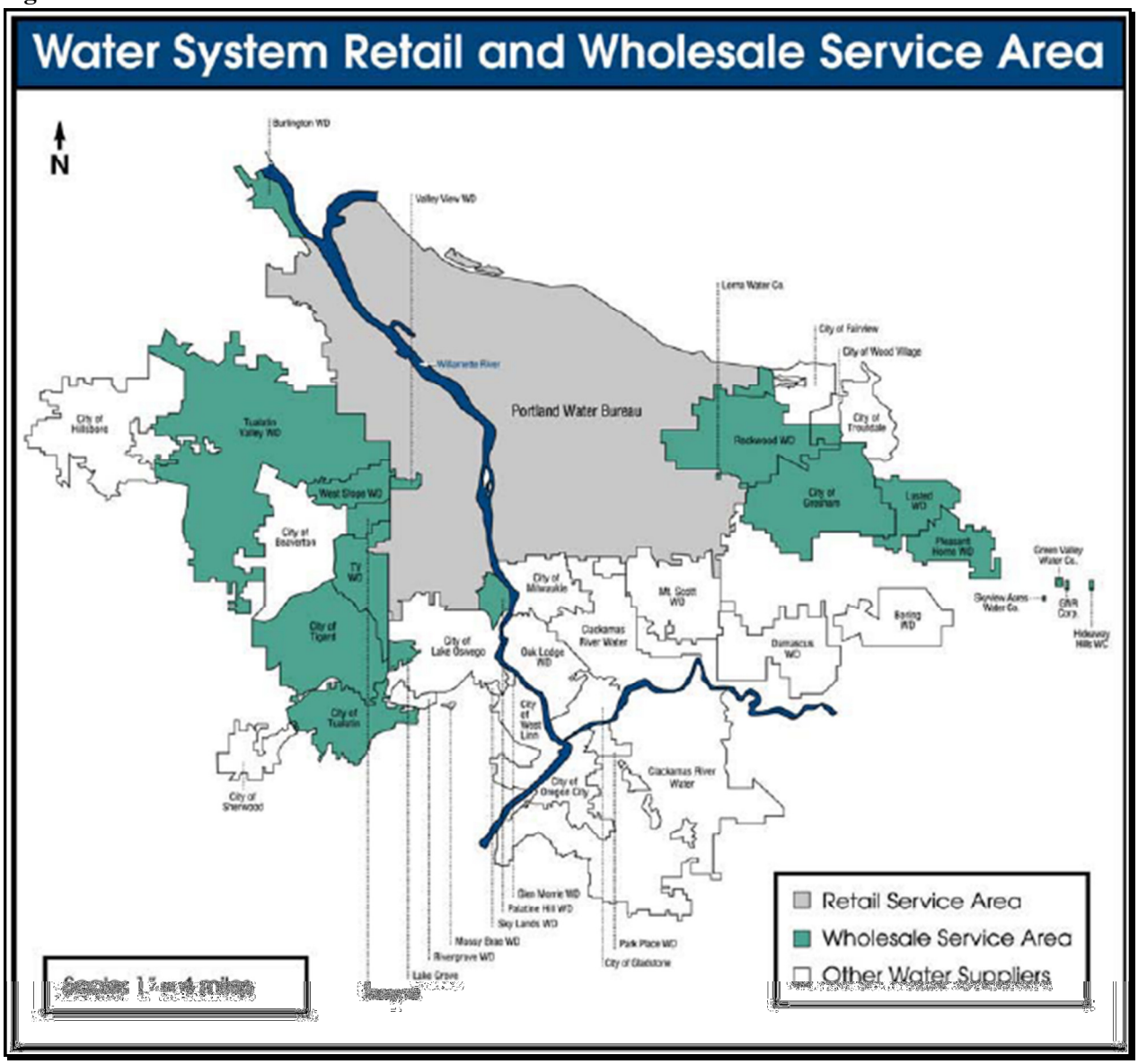
Water Utility	Monthly Bill
Local/Regional	
Seattle, WA	$68.48
Lake Oswego	$59.37
Olympia, WA	$57.74
Tacoma, WA	$55.93
Yachats, OR	$55.25
Puyallup, WA	$54.70
Portland, OR	**$53.33**
McMinnville	$48.34
Clackamas County	$44.00
Vancouver, WA	$43.10
Tigard	$41.21
Spokane, WA	$41.03
Bend, OR	$40.98
Eugene	$39.97
Beaverton	$39.72
Washington County	$39.21
Salem	$37.67
Milwaukie	$36.98
Corvallis	$35.94
Gresham	$32.69
Ashland	$29.73
National	
Atlanta, GA	$96.52
Honolulu, HI	$94.31
Juneau, AK	$58.81
Cincinnati, OH	$53.91
Portland, OR	**$53.33**
San Diego, CA	$51.62
San Francisco, CA	$51.12
Richmond, VA	$50.02
Knoxville, TN	$48.58
Sacramento, CA	$46.30
Charlotte, NC	$45.59
Boston, MA	$37.36
Washington, DC	$34.91
Nashville, TN	$31.49
Kansas City, MO	$28.73
Denver, CO	$20.76
Salt Lake City, UT	$13.56

Source: City of Portland Oregon, Second Lien Sewer System Revenue Bond, 2010 Series A (OR) Official Statement, CUSIP 736742ST5, Electronic Municipal Market Access, Table 17, p. 48.

Notes:

1. Monthly bills are as of July 2010. Bills are calculated on average sewer usage as reported by agency.
2. Unless indicated otherwise, local/regional utilities are within Oregon.

Figure A2.



Source: Portland Water Bureau

Table A7 shows the top ten largest commercial retail consumers of potable water in FY 2009-10 as well as the top six wholesale consumers. If the City were to raise funds for the remediation by increasing volumetric water rates, it is likely that the largest consumers would bear a large share of the burden.

Table A7. City of Portland Water Bureau: Major Users for Fiscal Year 2009-10

Retail Commercial Users	**Annual Usage (ccf)**	**Revenue**
Siltronic Corp	734,197	$1,772,339
Bureau of Park (City of Portland)	306,273	$785,305
Portland Public Schools	221,214	$610,265
Oregon Health Sciences University	223,302	$558,290
Precision Castparts	202,124	$495,014
Port of Portland	163,696	$427,964
Portland State University	125,384	$333,632
Housing Authority of Portland	120,690	$321,278
Vigor Industrial LLC	129,512	$316,520
Multnomah County Facilities and Property Management	118,616	$315,907
Largest Wholesale Users		
Tualatin Valley Water District	6,339,320	$6,784,022
Tigard, City of	2,550,541	$2,521,190
Gresham, City of	2,954,078	$2,103,040
Tualatin, City of	2,308,092	$2,086,692
Rockwood Water PUD	3,104,794	$2,003,454
West Slope Water District	537,173	$923,965

Source: City of Portland Oregon, First Lien Water System Revenue Bonds Series 2011A (OR) Official Statement, CUSIP 736754KC5, Electronic Municipal Market Access, Table 12, p. 44.

Table A8 shows the top ten largest retail customers of sewer water in FY 2008-09. If the City were to raise funds for the remediation by increasing volumetric water rates, it is likely that the largest customers would bear a large share of the burden.

Table A8. City of Portland, Oregon Sewer System: Largest Bureau Customers (FY 2008-09)

Customer	Total Sewer Charges	Percentage of Rate Revenues
Portland Public Schools	$2,085,698	1.00%
Port of Portland	$2,031,524	0.98%
Siltronic Corp.	$1,463,085	0.70%
Oregon Health and Science University (OHSU)	$1,445,439	0.70%
Darigold Inc. (formerly WestFarm Foods)	$1,403,933	0.69%
Precision Castparts	$1,303,102	0.67%
Portland State University	$1,091,391	0.63%
Housing Authority of Portland	$901,800	0.52%
American Property Management	$887,855	0.43%
Swan Island Dairy	$852,951	0.43%
Total	$13,466,778	6.75%

Source: City of Portland Oregon, Second Lien Sewer System Revenue Bond, 2010 Series A (OR) Official Statement, CUSIP 736742ST5, Electronic Municipal Market Access, Table 11, p. 41.